High Performance Computing Software

JPL Internal Seminar Series

Creating a Continental-Scale Stream Extraction Algorithm with an Implementation for Computational-Grid Based Systems

by

Josef Pohl

Department of Computer Science, University of Wyoming
Space Grant Affiliate

Thursday, August 14, 2003
12:00 noon – 1:00 p.m.
Building 126, Room 112

The Shuttle Radar Topography Mission (SRTM) data set contains approximately 135 billion elevation measurements taken over the Earth's surface. It is a data set of unprecedented size and accuracy that, when analyzed, will give Earth scientists a global view of topography and drainage networks. Current sequential processing methods for analyzing this data require too much time and space to be satisfactory. Here, we discuss both a new algorithm and implementation of that algorithm to analyze data sets of this size in a reasonable amount of time using a computational grid. Our new parallel algorithm is specifically designed to extract stream networks and related products on a continental scale. We also show that this processing is viable on NASA's Information Power Grid. The algorithm uses tools already developed for stream extraction but extends them to fit into a parallel architecture. Further, the algorithm uses several data-parallel techniques that are applied to the intermediate data-domains that arise during the course of the processing. The implementation is built in a modular fashion that allows components to be updated or replaced as better methods for drainage processing arise. We provide some preliminary results and analysis of the algorithm.

For questions, please contact Hans Zima at 4-8980.